

U.S. Patent Application no. 10/812,526  
Avago Technologies Docket no. 70030845-1  
SFTG8 Docket no. 01015.02021.1

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In Re Application of: Kong Weng LEE *et al.* )  
Application No.: 10/812,526 ) Group Art Unit: 2875  
Filed: March 29, 2004 ) Examiner: Makiya, David J.  
For: CERAMIC PACKAGING FOR ) Avago Docket No.: 70030845-1  
HIGH BRIGHTNESS LED DEVICES ) Confirmation No.: 3297

**DECLARATION OF KEE YEAN NG UNDER 37 C.F.R. §1.131**

Mail Stop Amendment  
Commissioner of Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

SMITH FROHWEIN TEMPET  
GREENLEE BLAHA L.L.C.  
CUSTOMER NO. 35856

I, KEE YEAN NG COINVENTOR, state the following:

1. I am over the age of twenty-one (21) years. I am not suffering from any disabilities, I am competent to make this Declaration, and have personal knowledge of the facts set forth herein.
2. I am a co-inventor of the subject matter disclosed and claimed in U.S. Patent Application no. 10/812,526.
3. The subject matter of the above-referenced patent application was conceived before February 25, 2004, the filing date of U.S. Publication No. 2005/0184387, which has been cited as a reference by the Examiner in U.S. Patent Application no. 10/812,526.

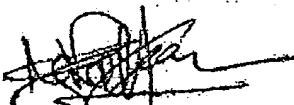
U.S. Patent Application no. 10/812,526  
Avago Technologies Docket no. 70030845-1  
SPTGB Docket no. 01813.020211

4. The invention of the above-referenced patent application was conceived at least as early as February 24, 2004, as evidenced by the Agilent Technologies Invention Disclosure form PDNO # 70030845, a true and accurate copy of which is attached as Exhibit A. Agilent Technologies Invention Disclosure form PDNO # 70030845 was prepared and submitted by coinventors Lee Klan Shin and Janet Bee Yin at least as early as February 24, 2004.
4. Based on the description and sketches included in the Agilent Technologies Invention Disclosure form PDNO # 70030845, it is evident that a person considered to be one of ordinary skill in the art would be possessed of sufficient information to practice the invention, and would believe the invention was conceived at least as early as February 24, 2004, as I believe the case to be, with regard to the construction of an a light emitting diode (LED) that comprises a ceramic substrate and a vertical ceramic side wall for mounting a light emitting diode.
5. During the period from at least as early as February 24, 2004 to March 29, 2004, the coinventors and I diligently assisted in the preparation and filing of the above-identified patent application, including, but not limited to, having a specification, claims and drawings drafted, reviewed, revised and filed.
6. As a coinventor, I diligently assisted in the preparation and filing of the above-identified U.S. Patent application, the filing of which constitutes a constructive reduction to practice of the subject matter disclosed, and claimed, in the above-referenced patent application.

I HEREBY DECLARE that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements are made with the knowledge that

U.S. Patent Application no. 10/812,526  
Avago Technologies Docket no. 70000845-1  
SPTGB Docket no. 01015.020201

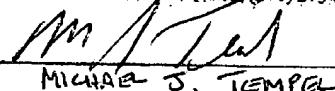
wilful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that any such wilful false statements may jeopardize the validity of the above-referenced patent application, or any patent issued thereon.

  
COINVENTOR signature  
Kee Yean Ng of Penang, Malaysia

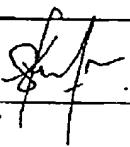
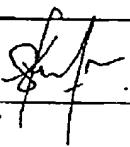
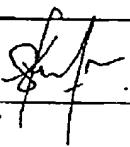
14 August 2006  
Date

CERTIFICATE OF FACSIMILE TRANSMISSION Under 37 C.F.R. § 1.8

I hereby certify that this correspondence, including any items indicated as attached or included, is being transmitted via facsimile transmission to the United States Patent and Trademark Office, (703) 273-8300, on the date indicated below.

  
MICHAEL J. TEMPEL  
8/3/06  
Date

## EXHIBIT A

Agilent Technologies		INVENTION DISCLOSURE	PAGE 1 OF 5								
		PDNo: 70030845	ATTORNEY: TXL								
<p><b>Instructions:</b> The information contained in this document is AGILENT CONFIDENTIAL and may not be disclosed to others without prior authorization. Submit this document to the Agilent Technologies Asia Pacific Legal Department in Singapore as soon as possible. No patent protection is possible until a detailed patent application is authorized, prepared, and submitted.</p>											
<p><b>Descriptive Title of Invention (less than 20 words):</b> Ceramic ChipLED</p>											
<p><b>Name of Agilent Technologies Division/Lab and related Project:</b> Optoelectronic Product Division, R&amp;D.</p>											
<p><b>Related Product Name/Number (if known):</b> ChipLED</p>											
<p><b>IMPORTANT! Anticipated date and location of all the following (if applicable):</b></p> <p>i) First publication or disclosure outside Agilent Technologies of information describing the invention</p> <p>ii) First demonstration or use of prototype embodying the invention to non-Agilent personnel</p> <p>iii) Release of product embodying the invention</p> <p><i>(If any of the above situations have already occurred or will occur within 3 months, call your Agilent IP attorney)</i></p> <p><b>NB. Public disclosure prior to filing a patent application at a Patent Office destroys the chance of patenting in most countries</b></p>											
<p><b>Contractual aspects:</b></p> <p>If the invention was made other than in the course of normal in-house Agilent R&amp;D please give brief details, for example if the invention was made:</p> <p>i) In a joint R&amp;D programme with a vendor, university or partner</p> <p>ii) During the course of developing a product for a particular customer</p>											
<p><b>Description of Invention (on separate sheets):</b> Please preserve all records of the invention and supply a brief description covering:</p> <p>A. Technical problem addressed by the invention</p> <p>B. Prior solutions (if any) and their disadvantages</p> <p>C. Solution offered by the invention and advantages of the invention over what has been done before</p> <p>D. Brief description of how to implement the invention (please include diagrams, preferably line drawings, but avoid colour)</p>											
<p><b>For Each Inventor Please Append The Following Information:</b> Use continuation sheet for additional inventors</p> <p>Please make clear and provide details if: (1) any non-Agilent personnel is involved, or (2) any inventor does NOT live in the same country as the relevant division, or (3) the invention was made (conceived) in another country (e.g. US)</p>											
<p><b>INVENTOR #1</b> <i>ATM LY-LEDs</i></p> <table border="1"> <tr> <td>Employee No. 802343</td> <td>Full Name Lee Klan Shin</td> <td>Signature </td> <td>Telel 680-8821</td> </tr> <tr> <td>Home Address 39-5-71 Kristal Height, Lintang Della 14, 11700 Gelugor, Penang</td> <td>Nationality Malaysian</td> <td>Entity &amp; Lab Name 2800,OPD R&amp;D Lab</td> <td></td> </tr> </table>				Employee No. 802343	Full Name Lee Klan Shin	Signature 	Telel 680-8821	Home Address 39-5-71 Kristal Height, Lintang Della 14, 11700 Gelugor, Penang	Nationality Malaysian	Entity & Lab Name 2800,OPD R&D Lab	
Employee No. 802343	Full Name Lee Klan Shin	Signature 	Telel 680-8821								
Home Address 39-5-71 Kristal Height, Lintang Della 14, 11700 Gelugor, Penang	Nationality Malaysian	Entity & Lab Name 2800,OPD R&D Lab									

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## INVENTION DISCLOSURE

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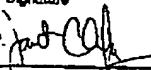
PDNo: 78030845

ATTORNEY:

PL

ADDITIONAL INVENTORS - Please observe the instructions on page 1

## INVENTOR #2

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Home Address		Nationality	Entity & Lab Name

## INVENTOR #4

Employee No.	Full Name	Signature	Telnet
Home Address		Nationality	Entity & Lab Name

## INVENTOR #5

Employee No.	Full Name	Signature	Telnet
Home Address		Nationality	Entity & Lab Name

## INVENTOR #6

Employee No.	Full Name	Signature	Telnet
Home Address		Nationality	Entity & Lab Name

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## INVENTION DISCLOSURE

PDNo:

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## A. Technical Problem addressed by the invention.

The present invention relates to using ceramic package as a platform to manufacture ChipLED. The package disclosed is a one-piece ceramic package consisting of substrate and a cubical shape dome with a reflector cup embedded. The transverse cross-section of the reflector defines an elongated figure, such as oblong, elliptical, rhombic or rectangular. A thin layer of high reflective material such as silver, gold can be plated on the reflector cup sidewall to channel the light to certain angle.

Semiconductor LED chips can then be attached onto the reflector cup of the package. Epoxy is then deposited onto the reflector cup to cover the LED chips.

Certain percentage of phosphor can be premix into the epoxy in order to produce white ChipLED before depositing

## B. Prior solutions and their disadvantages (if available, attach copies of product literature, technical articles, patents, etc.).

Conventional dice-free ChipLED package consists of PCB type substrate with a transfer-molded cubical shape dome, or a leadframe type substrate with a casted cubical shape dome. These kinds of package has a very wide viewing angle which is uncontrollable, and as a result a lot of light-loss to the sidewall. Consequently it has low intensity and low flux.

Conventional package has high thermal resistance, therefore it has low heat dissipation rate. Intensity and flux of light degrade when the junction temperature is high. As a result, conventional only work well in low current and low temperature condition.

For package with PCB type substrate, it cannot stand high temperature die bonding process, such as eutactic reflow.

## C. Solution offered by the invention and advantages of the invention over what has been done before.

A ceramic package according to the invention has a reflector cup with different shape and different angle. By changing the shape or tuning the angle of the reflector cup or adjusting the Z-location of die, it effectively narrowing the viewing angle and save the light loss to the side. Likewise, same method can be used to get certain specific wide viewing angle too.

Ceramic package has a comparatively high thermal conductivity; therefore the invention package can stand higher current with less degradation of light due to fast heat dissipation.

The invention package is suitable for high temperature die attached reflow process.

Due to the invention package having a cup where the die is located, epoxy can be deposited easily. Therefore, transfer-molding process that is difficult to be done on ceramic package can be avoided.

## D. Brief description of how to implement the invention (please include diagrams, preferably line drawings, but avoid color).

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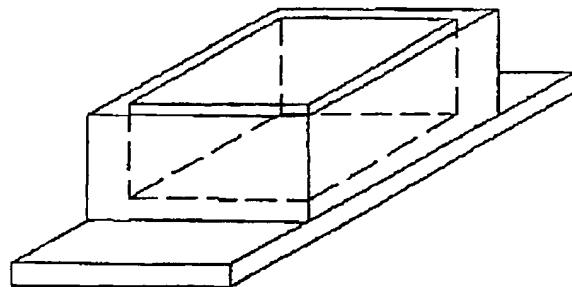
## INVENTION DISCLOSURE

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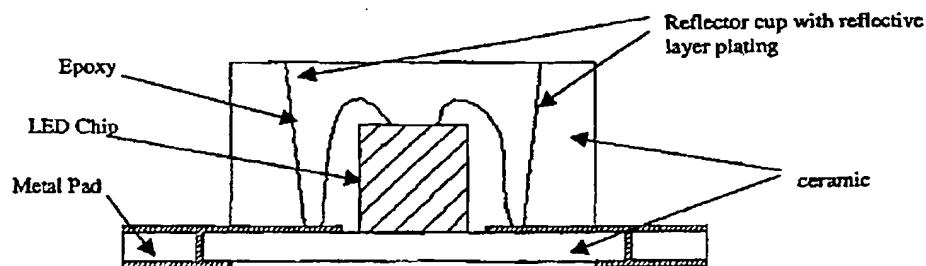
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Outline of the one-piece ceramic package. Reflector cup can have different shape.

Reflector with different shape



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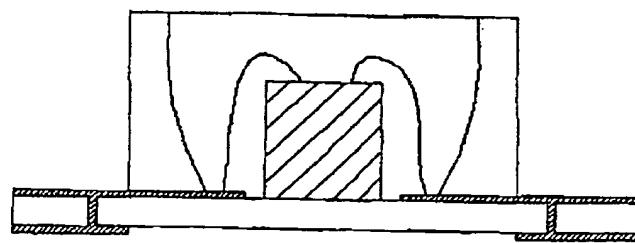
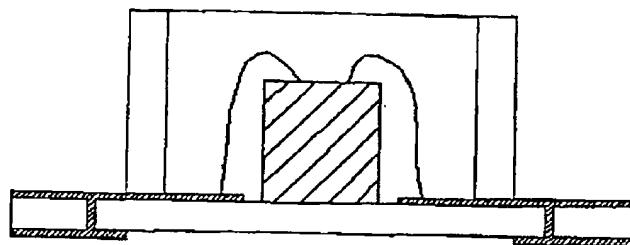
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